

REVISIONS																			
LTR	DESCRIPTION										DATE (YR-MO-DA)				APPROVED				
A	Add one vendor, CAGE 01295. Add case outline 2. Delete one vendor, CAGE 18324. Editorial changes throughout.										91-12-11				M. A. FRYE				
REV																			
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REV STATUS OF SHEETS				REV		A	A	A	A	A	A	A	A	A					
				SHEET		1	2	3	4	5	6	7	8	9					
PMIC N/A				PREPARED BY Rick C. Officer						DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444									
STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A				CHECKED BY Charles E. Besore															
				APPROVED BY Michael A. Frye						MICROCIRCUITS, LINEAR, LOW POWER DUAL OPERATIONAL AMPLIFIER, MONOLITHIC SILICON									
				DRAWING APPROVAL DATE 87-12-01															
				REVISION LEVEL A						SIZE A		CAGE CODE 67268		5962-87710					
						SHEET 1 OF 9													

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

<u>5962-87710</u>	<u>01</u>	<u>G</u>	<u>X</u>
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	LM158	Low power, dual operational amplifier
02	LM158A	Low power, dual operational amplifier

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
G	A-1 (8-lead, .370" x .185"), can
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), leadless chip carrier package

1.3 Absolute maximum ratings.

Supply voltage (V+)	32 V or ± 16 V
Input voltage	-0.3 V to +32 V
Differential input voltage	32 V
Storage temperature range	-65° C to +150° C
Maximum power dissipation (P_D): 1/	
Cases G and P	830 mW
Case 2	1375 mW
Lead temperature (soldering, 10 seconds)	+300° C
Case temperature for 60 seconds	+260° C
Junction temperature (T_J)	+175° C
Thermal resistance, junction-to-case (Θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions.

Ambient operating temperature range (T_A)	-55° C to +125° C
Operating supply voltage range (V+)	± 16 V

1/ Must withstand the added P_D due to short-circuit test (e.g., I_{OS}).

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2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standard, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 2.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55° C < T _A < +125° C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Power supply	I _{CC}	V ₊ = 5 V V ₊ = 30 V	1,2,3	01,02		1.2	mA
			1	01,02		3	
			2,3			4	
Output voltage high	V _{OH}	V ₊ = 30 V, R _L = 2 kΩ	1,2,3	01,02	26		V
Output voltage low	V _{OL}	V ₊ = 30 V, R _L = 10 kΩ	1,2,3	01		20	mV
			1	02		40	
			2,3			100	
		V ₊ = 30 V, I _{SINK} = 1 μA	1,2,3	01		20	
			1	02		40	
			2,3			100	
Output sink current	I _{SINK}	V ₊ = 15 V, V _{OUT} = 200 mV	1	01,02	12		μA
		V ₊ = 15 V, V _{OUT} = 2 V	1	01,02	10		mA
			2,3		5		
Output source current	I _{SOURCE}	V ₊ = 15 V, V _{OUT} = 2 V	1	01,02		-20	mA
			2,3			-10	
Short-circuit current	I _{OS}	V ₊ = 5 V, V _{OUT} = 0 V	1	01,02	-60		mA

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} < T_A < +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input offset voltage	V_{IO}	$V_+ = 30\text{ V}, V_{CM} = 0\text{ V}$ $V_+ = 30\text{ V}, V_{CM} = 28\text{ V}$ $V_+ = 5\text{ V}, V_{CM} = 0\text{ V}$	1	01	-5	5	mV
			2,3		-7	7	
			1	02	-2	2	
			2,3		-4	4	
Common mode rejection ratio	CMRR	$V_+ = 30\text{ V},$ $V_{IN} = 0\text{ V to } 28\text{ V}$	1	01,02	70		dB
Input bias current	$+I_{IB}$ $-I_{IB}$	$V_+ = 5\text{ V}, V_{CM} = 0\text{ V}$	1	01	-150	-1	nA
			2,3		-300	-1	
			1	02	-50	-1	
			2,3		-100	-1	
Input offset current	I_{IO}	$V_+ = 5\text{ V}, V_{CM} = 0\text{ V}$	1	01	-30	30	nA
			2,3		-100	100	
			1	02	-10	10	
			2,3		-30	30	
Power supply rejection ratio	PSRR	$V_+ = 5\text{ V to } 30\text{ V},$ $V_{CM} = 0\text{ V}$	1	01,02	65		dB
Common mode voltage range	V_{CM}	$V_+ = 30\text{ V}$	1,2,3	01,02		28	V
Large signal gain	A_{VS}	$V_+ = 15\text{ V}, R_L = 2\text{ k}\Omega,$ $V_O = 1\text{ V to } 11\text{ V } \frac{1}{/}$	4	01,02	50		V/mV
			5,6		25		

1/ Datalog reading in K = V/mV.

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Device types	01 and 02	
Case outlines	G and P	2
Terminal number	Terminal symbols	
1	OUTPUT A	NC
2	INVERTING INPUT A	OUTPUT A
3	NON-INVERTING INPUT A	NC
4	GND	NC
5	NON-INVERTING INPUT B	INVERTING INPUT A
6	INVERTING INPUT B	NC
7	OUTPUT B	NON-INVERTING INPUT A
8	V+	NC
9	---	NC
10	---	GND
11	---	NC
12	---	NON-INVERTING INPUT B
13	---	NC
14	---	NC
15	---	INVERTING INPUT B
16	---	NC
17	---	OUTPUT B
18	---	NC
19	---	NC
20	---	V+

NC = No connection

FIGURE 1. Terminal connections.

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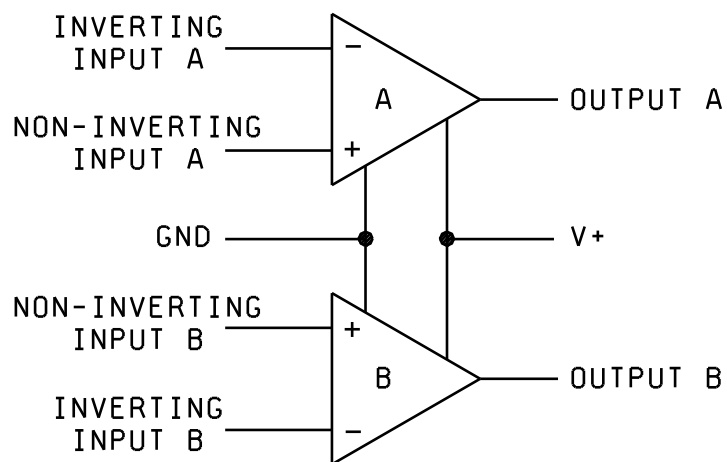


FIGURE 2. Logic diagram.

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3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) $T_A = +125^\circ\text{C}$, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,4,5,6
Group A test requirements (method 5005)	1,2,3,4,5,6
Groups C and D end-point electrical parameters (method 5005)	1,2,3

* PDA applies to subgroup 1.

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4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7, 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, method 1005 of MIL-STD-883.
 - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-5375.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.

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STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 91-12-11

Approved sources of supply for SMD 5962-87710 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-ECS. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN <u>1/</u>
5962-8771001GX	04713 27014	158/BGAJC LM158H/883
5962-8771001PX	01295 04713 27014	LM158JGB 158/BPAJC LM158J/883
5962-87710012X	01295	LM158FKB
5962-8771002GX	27014	LM158AH/883
5962-8771002PX	01295 27014	LM158AJGB LM158AJ/883
5962-87710022X	01295	LM158AFKB

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
number

Vendor name
and address

01295

Texas Instruments, Incorporated
13500 North Central Expressway
P.O. Box 655303
Dallas, TX 75265
Point of contact: I-20 at FM 1788
Midland, TX 79711-0448

04713

Motorola, Incorporated
P.O. Box 20906
Phoenix, AZ 20906

27014

National Semiconductor
2900 Semiconductor Drive
P.O. Box 58090
Santa Clara, CA 95052-8090

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